

CLAIMS

What is claimed is:

- 1 1. A method of measuring the availability of a network element or service, the method
2 comprising the computer-implemented steps of:
3 determining a second availability value based on a first availability value, a first time
4 value, a second time value that differs from the first time value, and a first
5 operational state value; and
6 storing the second availability value.
- 1 2. A method as recited in Claim 1, wherein determining the second availability value
2 further comprises the steps of:
3 determining a dividend based on the first availability value, the first time value, the
4 second time value, and the first operational state value; and
5 dividing the dividend by the second time value.
- 1 3. A method as recited in Claim 2, wherein determining the dividend further comprises
2 the steps of:
3 determining a first addend based on the first availability value and the first time
4 value;
5 determining a second addend based on the first operational state value, the second
6 time value, and the first time value; and
7 adding the first addend and the second addend.
- 1 4. A method as recited in Claim 3, wherein determining the first addend further
2 comprises multiplying the first availability value and the first time value.

- 1 5. A method as recited in Claim 3, wherein determining the second addend further
2 comprises the steps of:
3 determining a multiplicand based on the second time value and the first time value;
4 and
5 multiplying the multiplicand and the first operational state value.
- 1 6. A method as recited in Claim 5, wherein determining the multiplicand further
2 comprises the step of subtracting the first time value from the second time value.
- 1 7. A method as recited in Claim 1, further comprising the steps of:
2 determining a third availability value based on the second availability value, the
3 second time value, a third time value that differs from the second time value,
4 and a second operational state value; and
5 storing the third availability value.
- 1 8. A method as recited in Claim 1, wherein determining the second availability value
2 further comprises the steps of:
3 detecting a command; and
4 in response to detecting the command, determining a third availability value based on
5 the second availability value, the second time value, a third time value that
6 differs from the second time value, and a second operational state value.
- 1 9. A method as recited in Claim 1, further comprising the steps of:
2 detecting an event while a current state is a first state that is in a first state cluster;

3 in response to detecting the event, selecting, based on the current state and a type of
4 the event, a second state that is in a second state cluster;
5 determining whether the first state and the second state are in different state clusters;
6 and
7 in response to determining that the first state and the second state are in different state
8 clusters, determining a third availability value based on the second availability
9 value, the second time value, a third time value that differs from the second
10 time value, and a second operational state value that differs from the first
11 operational state value.

1 10. A method as recited in Claim 1, further comprising the steps of:
2 determining whether the second availability value is less than a lowest recorded
3 availability value; and
4 if the second availability value is less than the lowest recorded availability value, then
5 storing the second availability value as the lowest recorded availability value.

1 11. A method as recited in Claim 1, further comprising the steps of:
2 comparing the second availability value with the first availability value;
3 based on the comparing, selecting, from among a plurality of trend indicators, a
4 particular trend indicator; and
5 storing the particular trend indicator.

1 12. A method as recited in Claim 11, wherein selecting the particular trend indicator
2 further comprises the steps of:
3 selecting a first trend indicator if the first availability value is less than the second
4 availability value;
5 selecting a second trend indicator if the first availability value is equal to the second
6 availability value; and
7 selecting a third trend indicator if the first availability value is greater than the second
8 availability value;
9 wherein the first, second, and third trend indicators differ from each other.

1 13. A method as recited in Claim 1, further comprising the steps of:
2 determining a third availability value based on the first availability value, the second
3 availability value, and a weight value; and
4 storing the third availability value.

1 14. A method as recited in Claim 13, wherein determining the third availability value
2 further comprises the steps of:
3 determining a dividend based on the first availability value, the second availability
4 value, and the weight value;
5 determining a divisor based on the weight value; and
6 dividing the dividend by the divisor.

1 15. A method as recited in Claim 14, wherein determining the dividend further comprises
2 the steps of:
3 determining an addend based on the second availability value and the weight value;
4 and;
5 adding the addend and the first availability value.

1 16. A method as recited in Claim 15, wherein determining the addend further comprises
2 the step of multiplying the second availability value and the weight value.

1 17. A method as recited in Claim 13, further comprising the step of:
2 determining the weight value based on the difference between the first time value and
3 the second time value.

1 18. A method as recited in Claim 13, further comprising the step of:
2 determining the weight value based on a type of event.

1 19. A method as recited in Claim 13, further comprising the step of:
2 determining the weight value based on a type of the network element.

1 20. A method of measuring the availability of a network element or service, the method
2 comprising the computer-implemented steps of:
3 detecting an event while a current state is a first state that is in a first state cluster;
4 in response to detecting the event, selecting, based on the current state and a type of
5 the event, a second state that is in a second state cluster;
6 determining whether the first state and the second state are in different state clusters;
7 and
8 in response to determining that the first state and the second state are in different state
9 clusters, performing the steps of:
10 multiplying a current availability value and a current time value to produce a
11 first addend;
12 subtracting the current time value from a new time value to produce a
13 multiplicand;
14 multiplying the multiplicand and an operational state value to produce a
15 second addend;
16 adding the first addend and the second addend to produce a dividend;
17 dividing the dividend by the new time value to produce a new availability
18 value;
19 setting the current availability value equal to the new availability value; and
20 setting the current time value equal to the new time value.

1 21. A method as recited in Claim 20, wherein the new time value is equal to the amount
2 of time between an initializing of the network element or service and the detecting of
3 the event.

- 1 22. A method as recited in Claim 20, further comprising the step of determining the
2 operational state value based on which particular state cluster among a plurality of
3 state clusters contains the first state.
- 1 23. A method as recited in Claim 20, further comprising the step of setting the current
2 state equal to the second state.
- 1 24. A computer-readable medium carrying one or more sequences of instructions for
2 measuring the availability of a network element or service, which instructions, when
3 executed by one or more processors, cause the one or more processors to carry out the
4 steps of:
5 determining a second availability value based on a first availability value, a first time
6 value, a second time value that differs from the first time value, and a first
7 operational state value; and
8 storing the second availability value.
- 1 25. A computer-readable medium as recited in Claim 24, wherein determining the second
2 availability value further comprises the steps of:
3 determining a dividend based on the first availability value, the first time value, the
4 second time value, and the first operational state value; and
5 dividing the dividend by the second time value.
- 1 26. A computer-readable medium as recited in Claim 25, wherein determining the
2 dividend further comprises the steps of:
3 determining a first addend based on the first availability value and the first time
4 value;
5 determining a second addend based on the first operational state value, the second
6 time value, and the first time value; and
7 adding the first addend and the second addend.

- 1 27. A computer-readable medium as recited in Claim 26, wherein determining the first
2 addend further comprises multiplying the first availability value and the first time
3 value.
- 1 28. A computer-readable medium as recited in Claim 26, wherein determining the second
2 addend further comprises the steps of:
3 determining a multiplicand based on the second time value and the first time value;
4 and
5 multiplying the multiplicand and the first operational state value.
- 1 29. A computer-readable medium as recited in Claim 28, wherein determining the
2 multiplicand further comprises the step of subtracting the first time value from the
3 second time value.
- 1 30. A computer-readable medium as recited in Claim 24, further comprising instructions
2 for performing the steps of:
3 determining a third availability value based on the second availability value, the
4 second time value, a third time value that differs from the second time value,
5 and a second operational state value; and
6 storing the third availability value.
- 1 31. A computer-readable medium as recited in Claim 24, wherein determining the second
2 availability value further comprises the steps of:
3 detecting a command; and
4 in response to detecting the command, determining a third availability value based on
5 the second availability value, the second time value, a third time value that
6 differs from the second time value, and a second operational state value.

1 32. A computer-readable medium as recited in Claim 24, further comprising instructions
2 for performing the steps of:
3 detecting an event while a current state is a first state that is in a first state cluster;
4 in response to detecting the event, selecting, based on the current state and a type of
5 the event, a second state that is in a second state cluster;
6 determining whether the first state and the second state are in different state clusters;
7 and
8 in response to determining that the first state and the second state are in different state
9 clusters, determining a third availability value based on the second availability
10 value, the second time value, a third time value that differs from the second
11 time value, and a second operational state value that differs from the first
12 operational state value.

1 33. A computer-readable medium as recited in Claim 24, further comprising instructions
2 for performing the steps of:
3 determining whether the second availability value is less than a lowest recorded
4 availability value; and
5 if the second availability value is less than the lowest recorded availability value, then
6 storing the second availability value as the lowest recorded availability value.

1 34. A computer-readable medium as recited in Claim 24, further comprising instructions
2 for performing the steps of:
3 comparing the second availability value with the first availability value;
4 based on the comparing, selecting, from among a plurality of trend indicators, a
5 particular trend indicator; and
6 storing the particular trend indicator.

1 35. A computer-readable medium as recited in Claim 34, wherein selecting the particular
2 trend indicator further comprises the steps of:
3 selecting a first trend indicator if the first availability value is less than the second
4 availability value;
5 selecting a second trend indicator if the first availability value is equal to the second
6 availability value; and
7 selecting a third trend indicator if the first availability value is greater than the second
8 availability value;
9 wherein the first, second, and third trend indicators differ from each other.

1 36. A computer-readable medium as recited in Claim 24, further comprising instructions
2 for performing the steps of:
3 determining a third availability value based on the first availability value, the second
4 availability value, and a weight value; and
5 storing the third availability value.

1 37. A computer-readable medium as recited in Claim 36, wherein determining the third
2 availability value further comprises the steps of:
3 determining a dividend based on the first availability value, the second availability
4 value, and the weight value;
5 determining a divisor based on the weight value; and
6 dividing the dividend by the divisor.

1 38. A computer-readable medium as recited in Claim 37, wherein determining the
2 dividend further comprises the steps of:
3 determining an addend based on the second availability value and the weight value;
4 and;
5 adding the addend and the first availability value.

- 1 39. A computer-readable medium as recited in Claim 38, wherein determining the addend
2 further comprises the step of multiplying the second availability value and the weight
3 value.
- 1 40. A computer-readable medium as recited in Claim 36, further comprising instructions
2 for performing the step of:
3 determining the weight value based on the difference between the first time value and
4 the second time value.
- 1 41. A computer-readable medium as recited in Claim 36, further comprising instructions
2 for performing the step of:
3 determining the weight value based on a type of event.
- 1 42. A computer-readable medium as recited in Claim 36, further comprising instructions
2 for performing the step of:
3 determining the weight value based on a type of the network element.
- 1 43. An apparatus for measuring the availability of a network element or service,
2 comprising:
3 means for determining a second availability value based on a first availability value, a
4 first time value, a second time value that differs from the first time value, and
5 a first operational state value; and
6 means for storing the second availability value.
- 1 44. An apparatus for measuring the availability of a network element or service,
2 comprising:
3 a network interface that is coupled to a data network for receiving one or more packet
4 flows therefrom;
5 a processor;

6 one or more stored sequences of instructions which, when executed by the processor,
7 cause the processor to carry out the steps of:
8 determining a second availability value based on a first availability value, a
9 first time value, a second time value that differs from the first time
10 value, and a first operational state value; and
11 storing the second availability value.